

Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

Applications

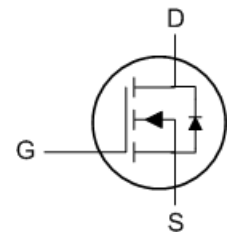
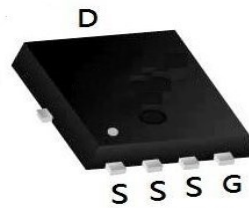
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Product Summary



| BVDSS | RDSON | ID |
|-------|--------|------|
| 40V | 0.75mΩ | 225A |

PDFN5060-8L Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------------|--|------------|------------------|
| V_{DS} | Drain-Source Voltage | 40 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 225 | A |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 141 | A |
| I_{DM} | Pulsed Drain Current ² | 900 | A |
| EAS | Single Pulse Avalanche Energy ³ | 627.2 | mJ |
| I_{AS} | Avalanche Current | 56 | A |
| $P_D@T_C=25^\circ\text{C}$ | Total Power Dissipation ⁴ | 114 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ¹ | --- | 50 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 1.1 | $^\circ\text{C/W}$ |

Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|--|--|------|------|-----------|----------------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 40 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BV_{DSS} Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | --- | --- | --- | $V/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=17A$ | --- | 0.75 | 1 | m Ω |
| | | $V_{GS}=4.5V, I_D=8A$ | --- | 1.05 | 1.4 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.7 | 2.4 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | --- | --- | $\text{mV}/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=40V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=40V, V_{GS}=0V, T_J=100^\circ\text{C}$ | --- | --- | 100 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| g_{fs} | Forward Transconductance | $V_{DS}=10V, I_D=17A$ | --- | 105 | --- | S |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$ | --- | 2.2 | --- | Ω |
| Q_g | Total Gate Charge | $V_{DS}=20V, V_{GS}=10V, I_D=17A$ | --- | 118 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 19 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 22.2 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{GS}=10V, V_{DD}=20V, I_D=17A, R_{GEN}=3\Omega$ | --- | 13.8 | --- | ns |
| T_r | Rise Time | | --- | 14 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 91 | --- | |
| T_f | Fall Time | | --- | 43 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$ | --- | 6650 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 1495 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 103 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|--|--|------|------|------|------|
| I_S | Continuous Source Current ^{1,4} | $V_G=V_D=0V$, Force Current | --- | --- | 225 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=17A, T_J=25^\circ\text{C}$ | --- | --- | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_F=17A, di/dt=100\text{A}/\mu\text{s}$, | --- | 66 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | $T_J=25^\circ\text{C}$ | --- | 39.6 | --- | nC |

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$.
2. The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.4\text{mH}, I_{AS}=56A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test..

Typical Characteristics

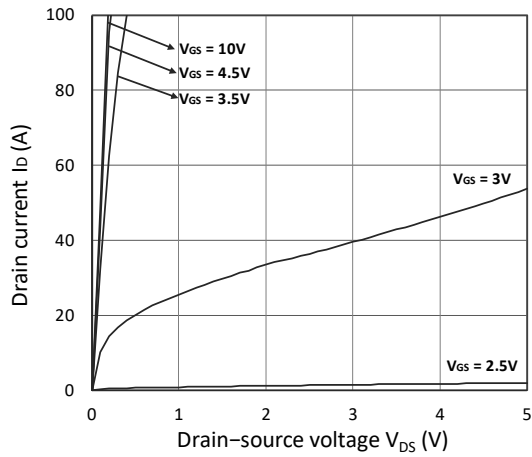


Figure 1. Output Characteristics

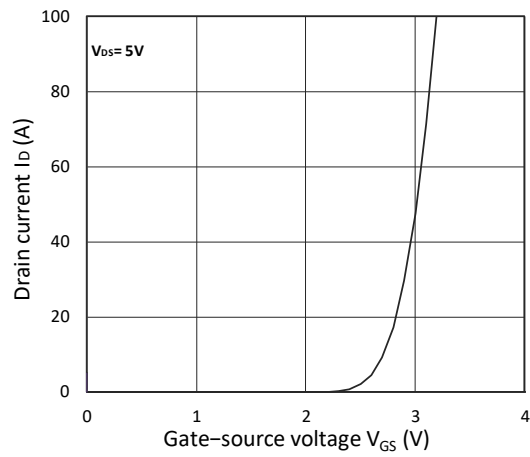


Figure 2. Transfer Characteristics

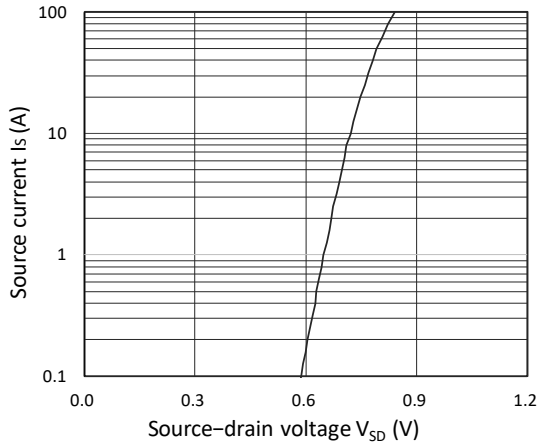


Figure 3. Forward Characteristics of Reverse

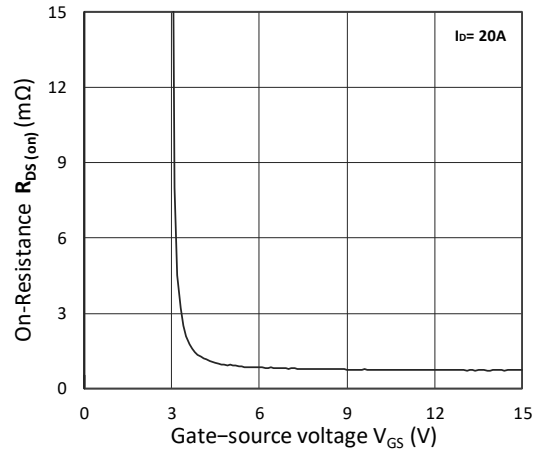


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

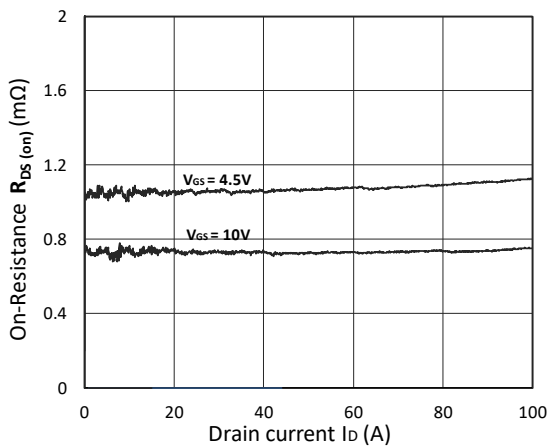


Figure 5. $R_{DS(ON)}$ vs. I_D

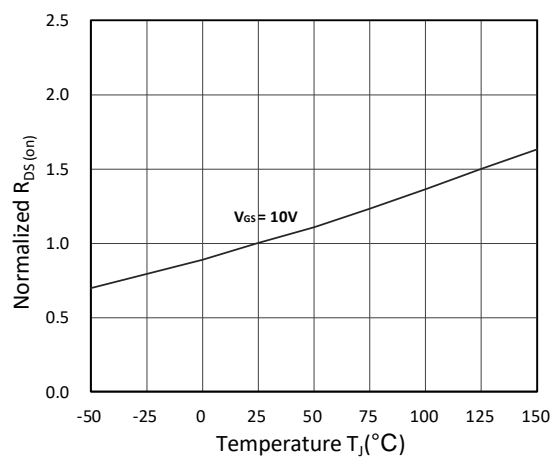


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

N-Ch 40V Fast Switching MOSFETs

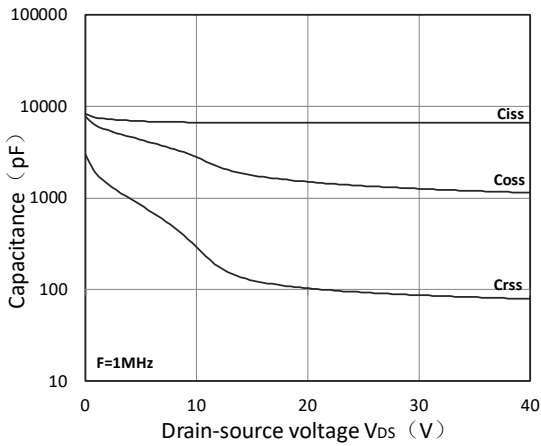


Figure 7. Capacitance Characteristics

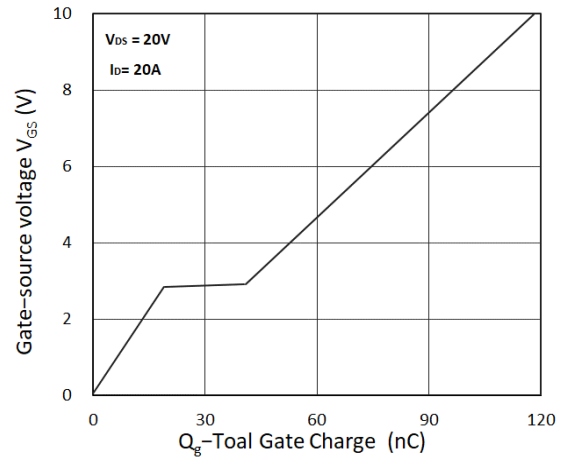


Figure 8. Gate Charge Characteristics

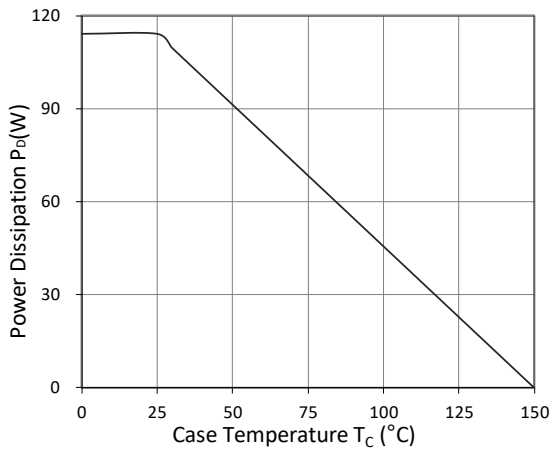


Figure 9. Power Dissipation

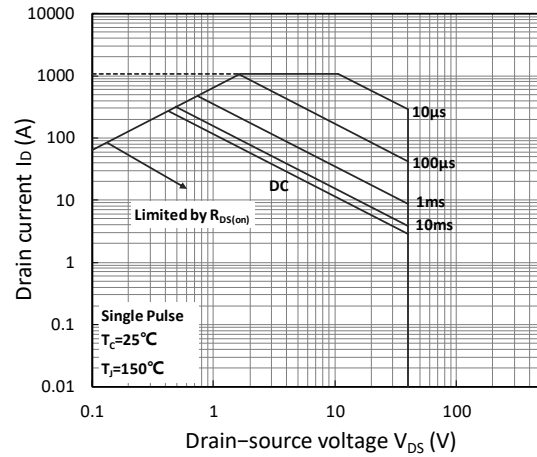


Figure 10. Safe Operating Area

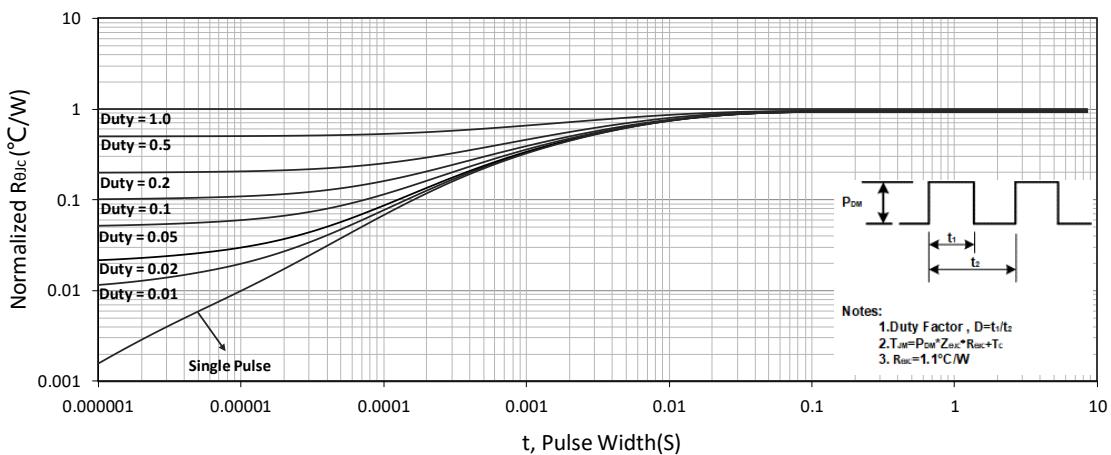


Figure 11. Normalized Maximum Transient Thermal Impedance

Figure A: Gate Charge Test Circuit & Waveforms

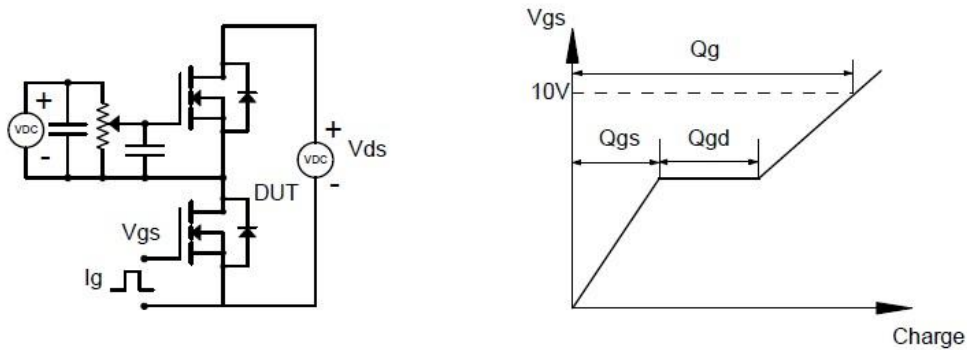


Figure B: Resistive Switching Test Circuit & Waveforms

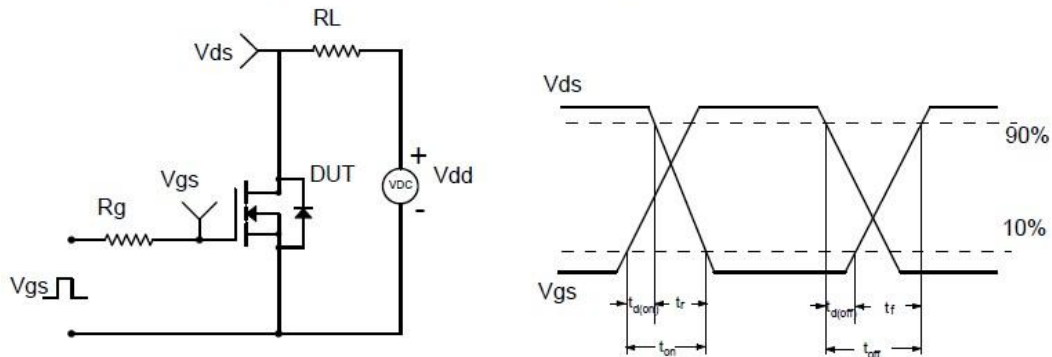


Figure C: Unclamped Inductive Switching (UIS) Test

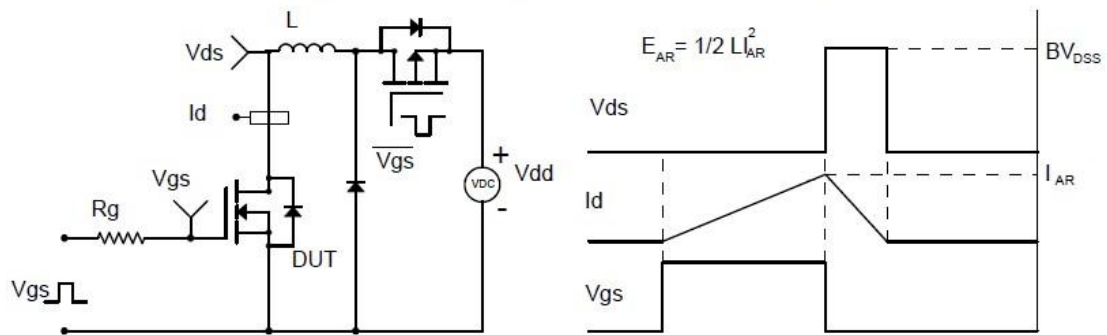
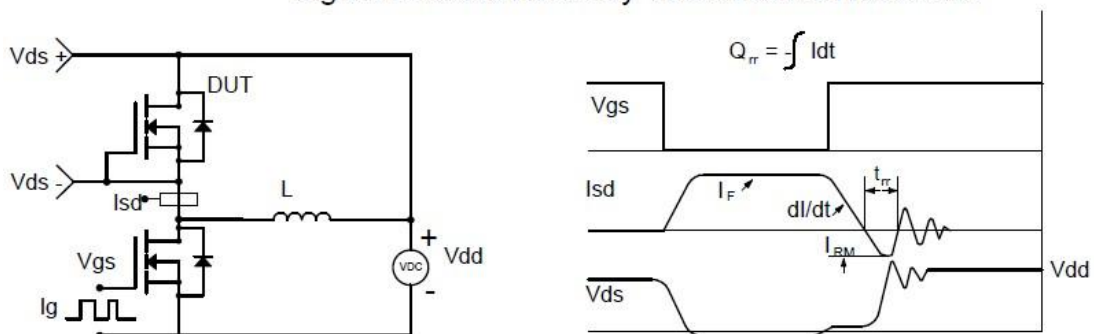
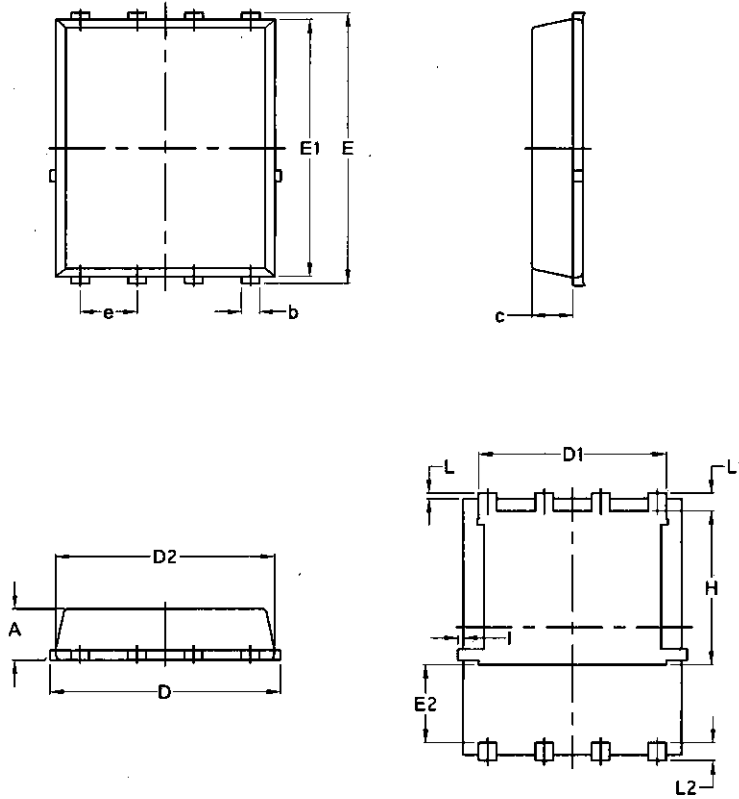


Figure D: Diode Recovery Test Circuit & Waveforms



Package Mechanical Data-PDFN5060-8L-JQ Single



| Symbol | Common | | | |
|--------|----------|--------|----------|--------|
| | mm | | Inch | |
| | Min | Max | Min | Max |
| A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| c | 0.824 | 0.0970 | 0.0324 | 0.082 |
| D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| D1 | 4.11 | 4.31 | 0.1618 | 0.1697 |
| D2 | 4.80 | 5.00 | 0.1890 | 0.1969 |
| E | 5.95 | 6.15 | 0.2343 | 0.2421 |
| E1 | 5.65 | 5.85 | 0.2224 | 0.2303 |
| E2 | 1.60 | / | 0.0630 | / |
| e | 1.27 BSC | | 0.05 BSC | |
| L | 0.05 | 0.25 | 0.0020 | 0.0098 |
| L1 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| L2 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| H | 3.30 | 3.50 | 0.1299 | 0.1378 |
| I | / | 0.18 | / | 0.0070 |